First Pass at the HCal tiles cosmic stand

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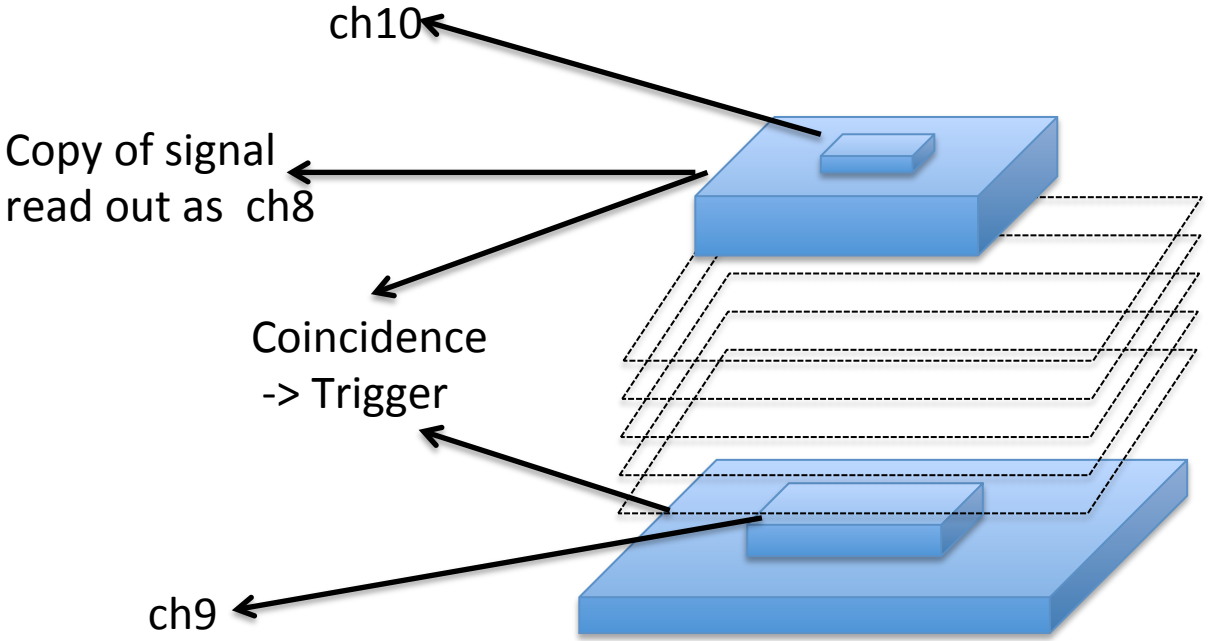
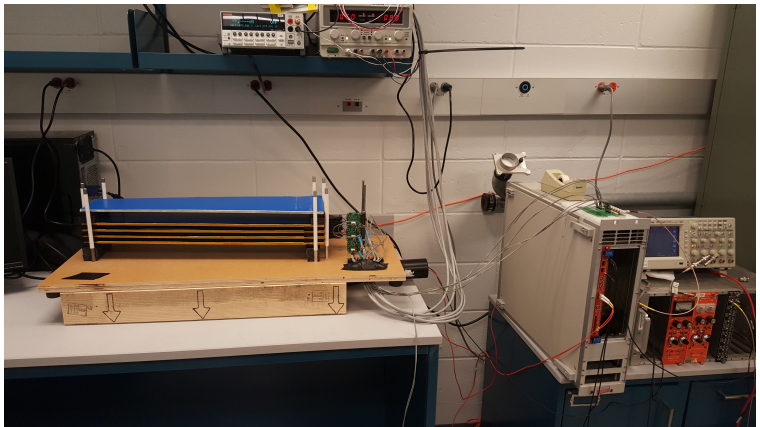
Setup

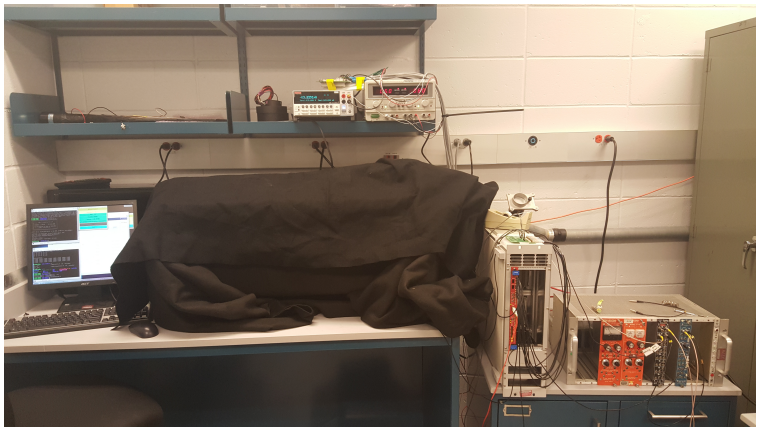
- 5 –stack with 4 actually read out
- Differential signal converted to standard one with transformers
- Digitized with CAEN 1742 Waveform digitizer with RCDAQ

Cosmic Ray Stand

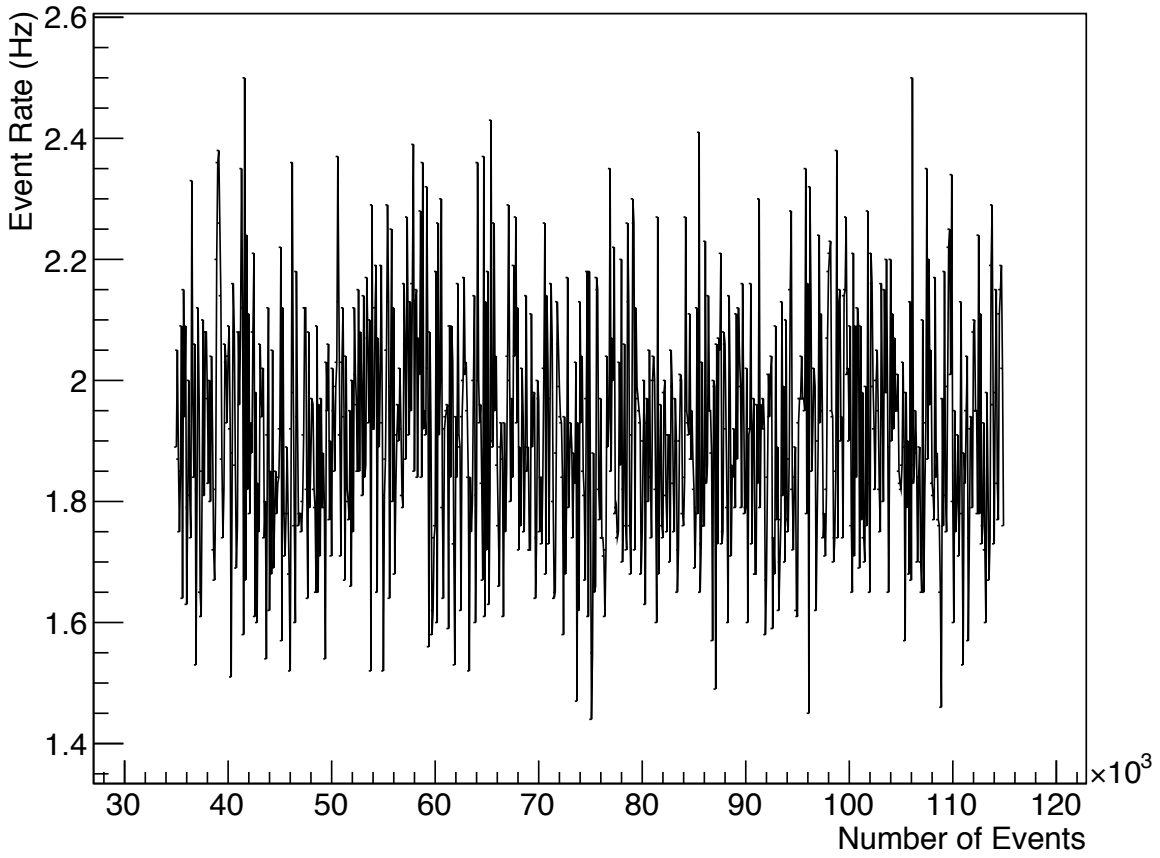


Low	high
ch3	ch7
ch2	ch6
ch1	ch5
ch0	ch4





Cosmic events rates



The Waveforms

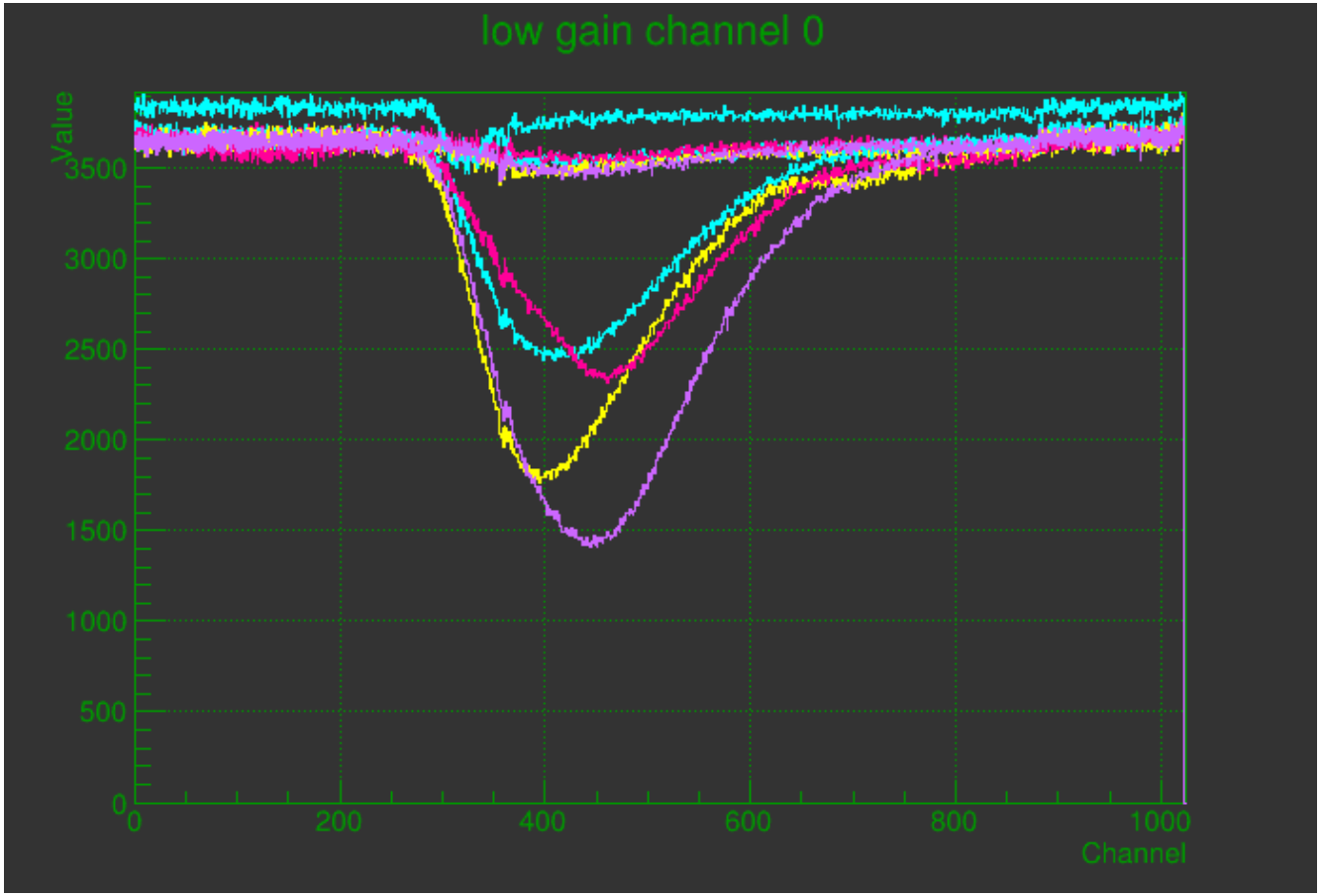
"Baseline" == integral samples 158-180

Raw Signal == integral samples 210-800

Both normalized

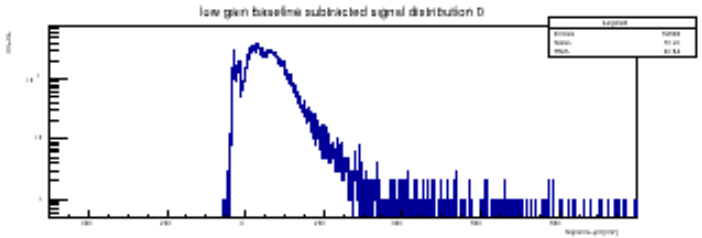
Signal is raw – baseline event by event

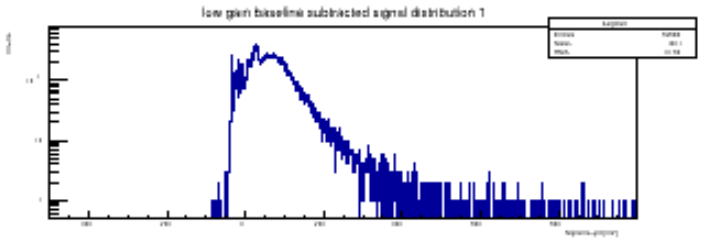
Also made a "fixed baseline" calculation to check

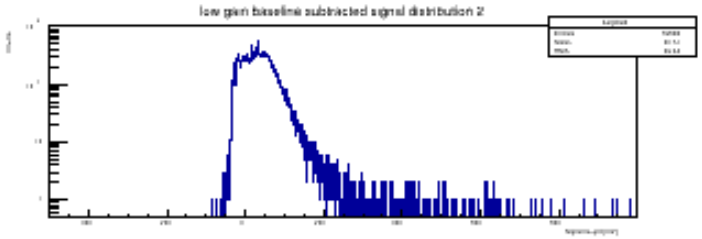


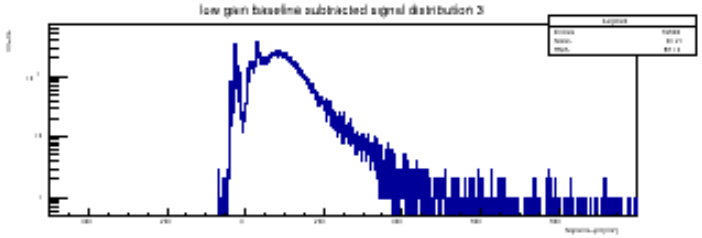
Signal Distributions

Low Gain

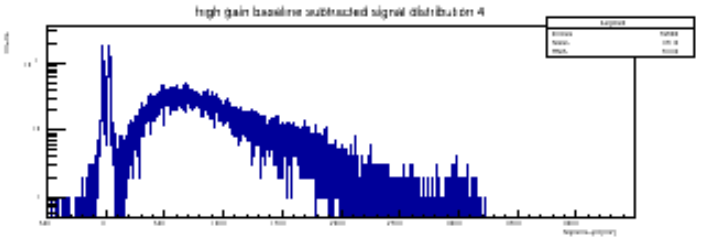


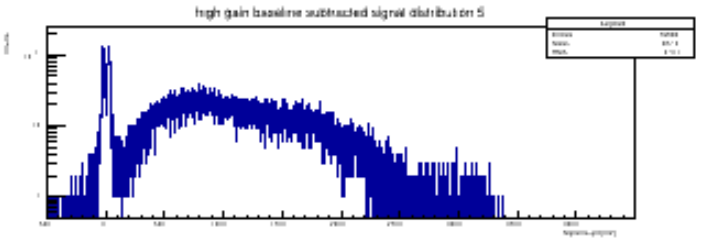


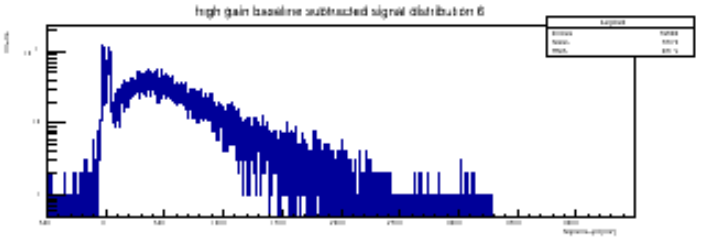


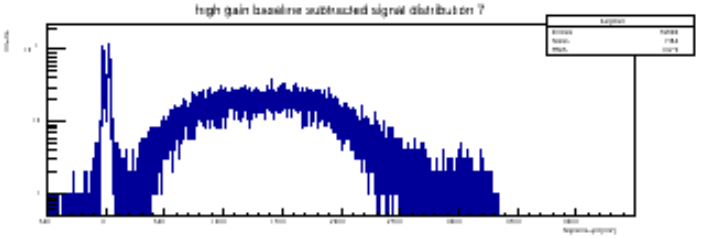


High Gain





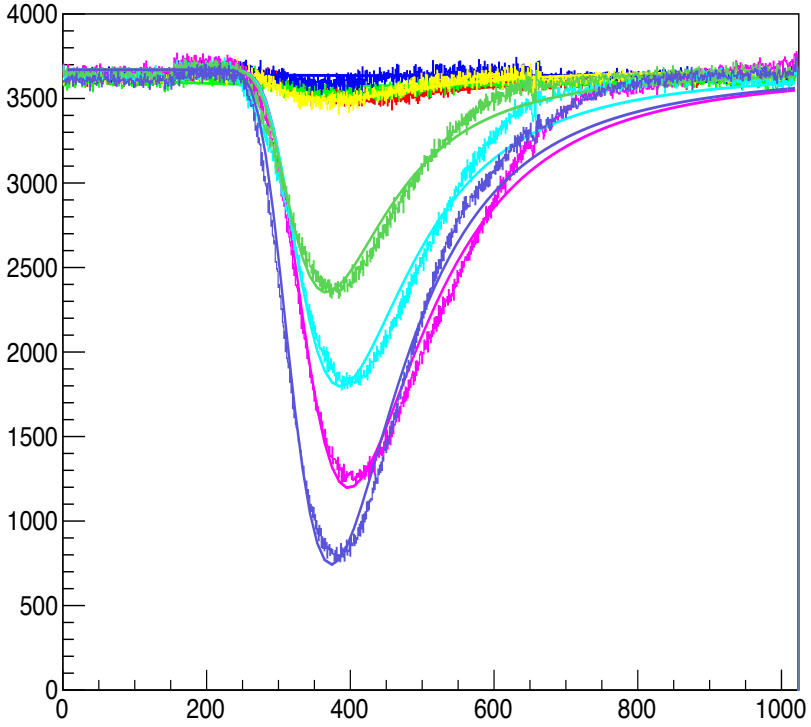




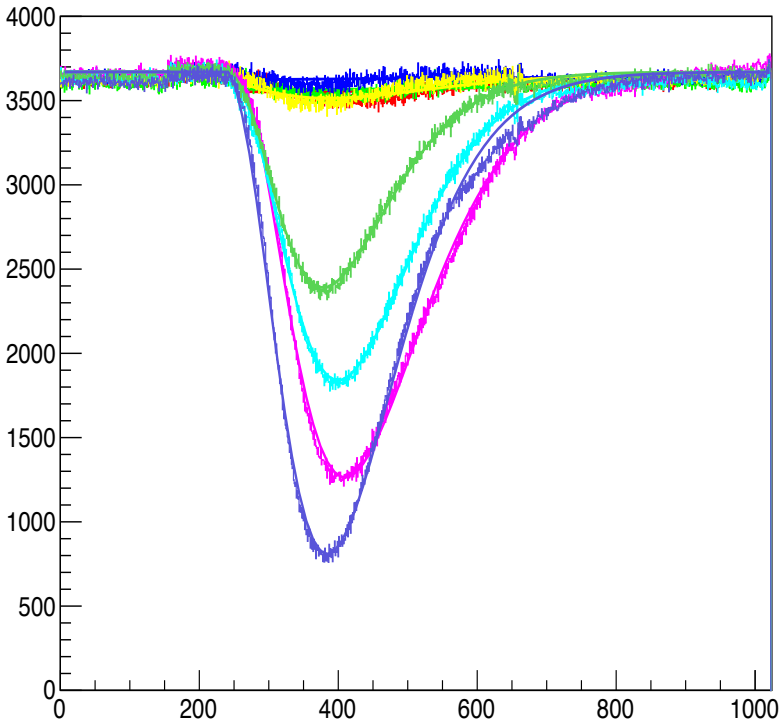
Of course, with that simple-minded approach, there is no single photon peak in evidence

Alternate method: fits

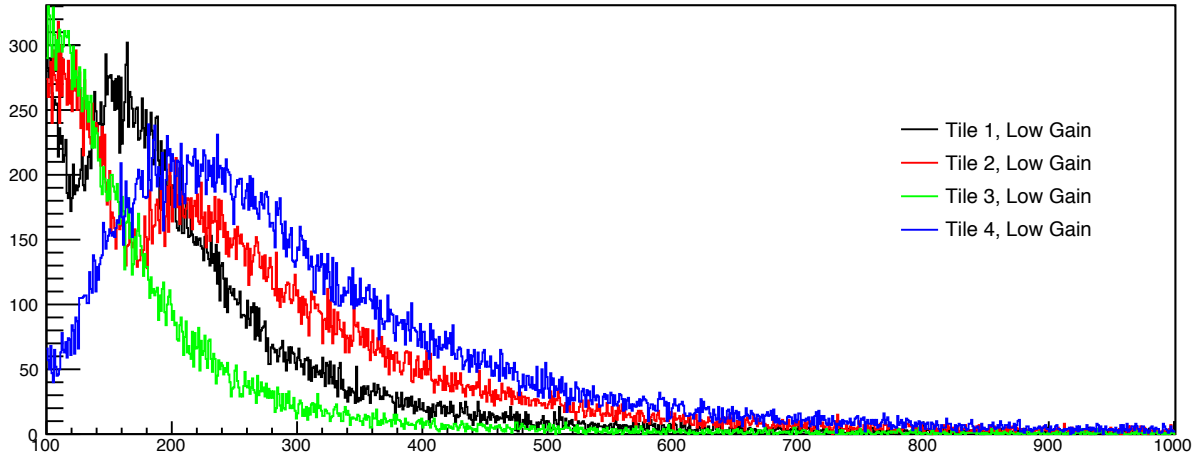
Landau fit

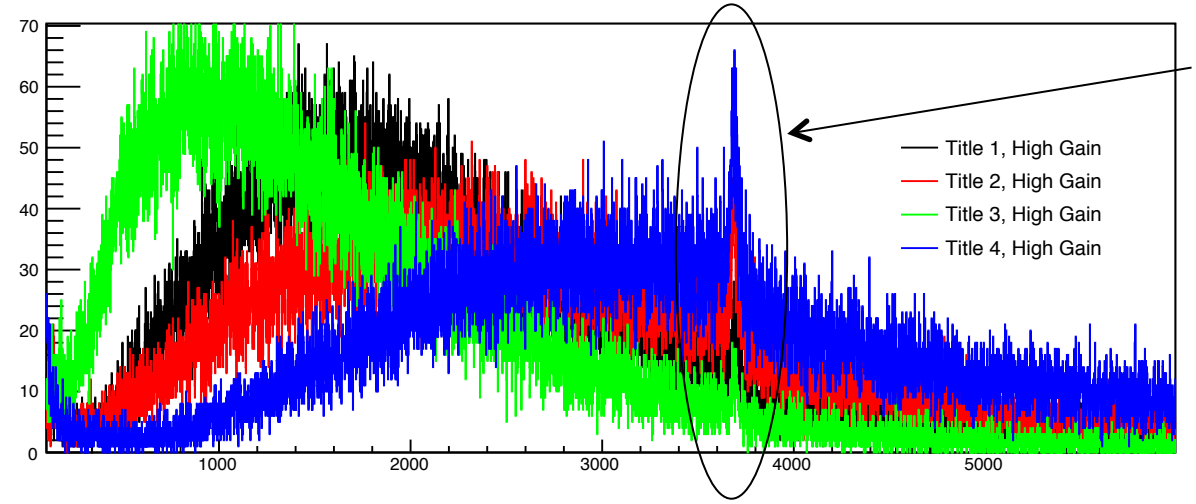


Pol+exp fit



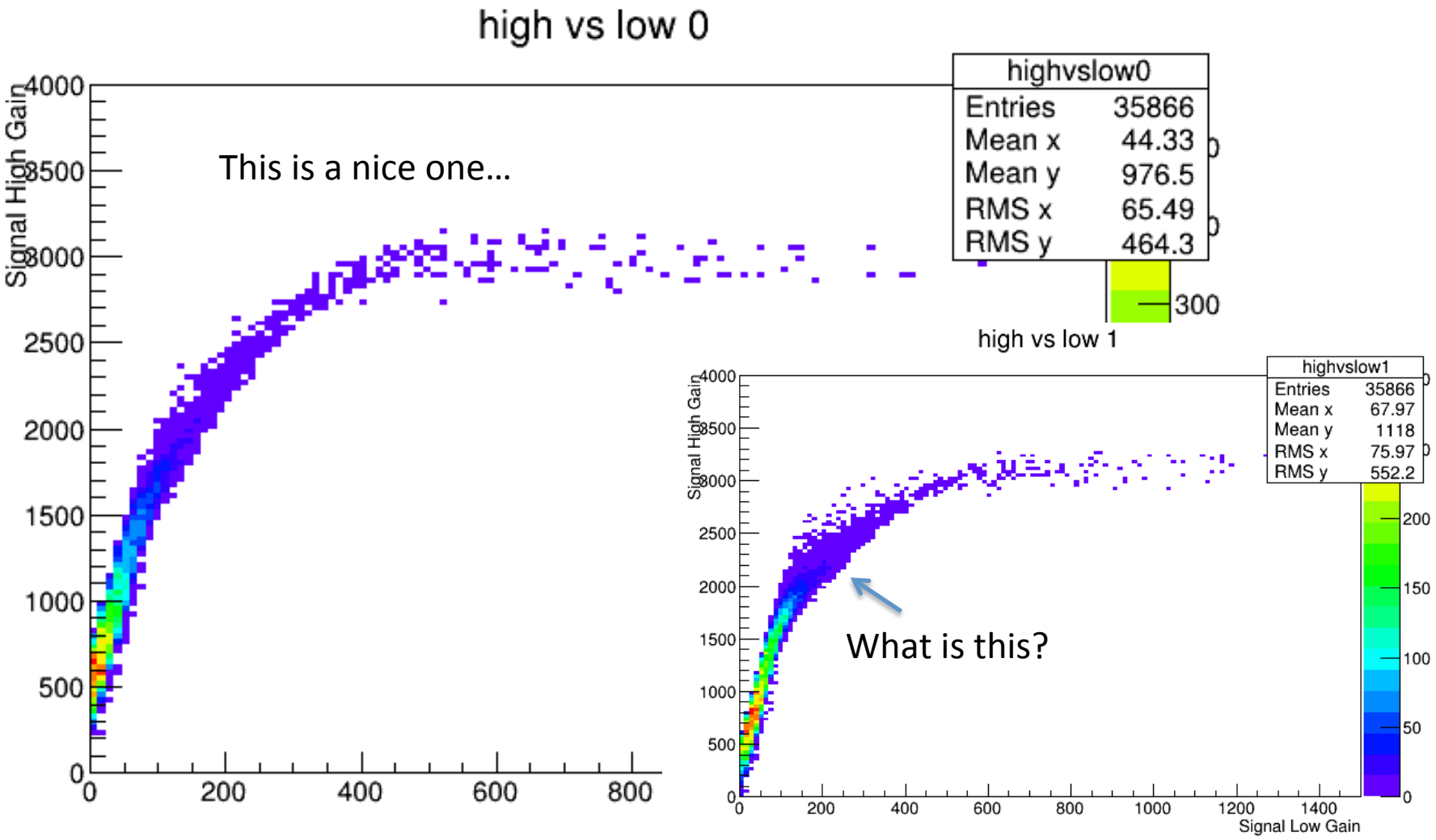
Signal from the fits



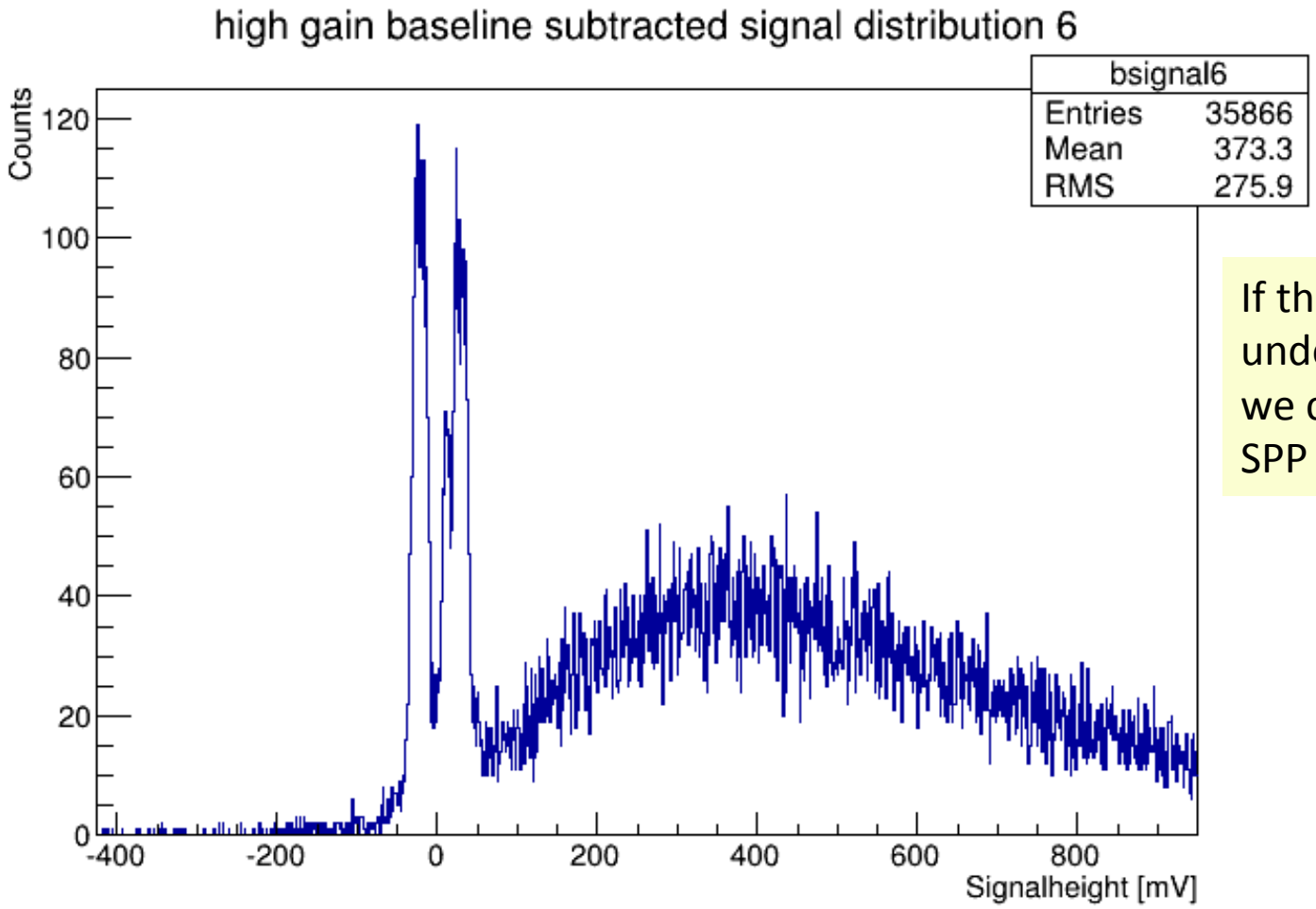


This is because of fits. The maximum size of the signal is ~3700.

High-low gain correlation

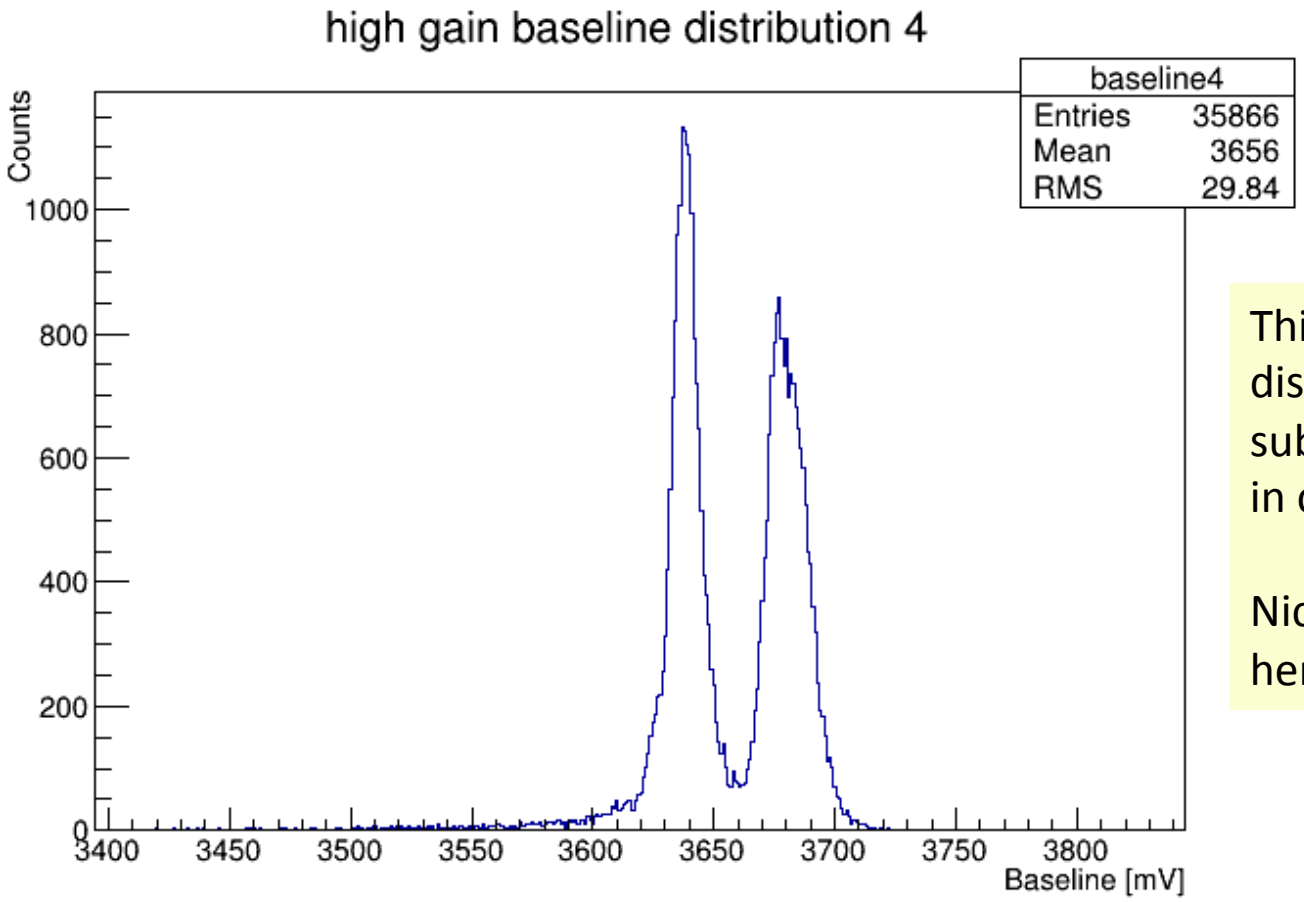


Double Peaks



If that structure underlies the signal, we can not see the SPP here

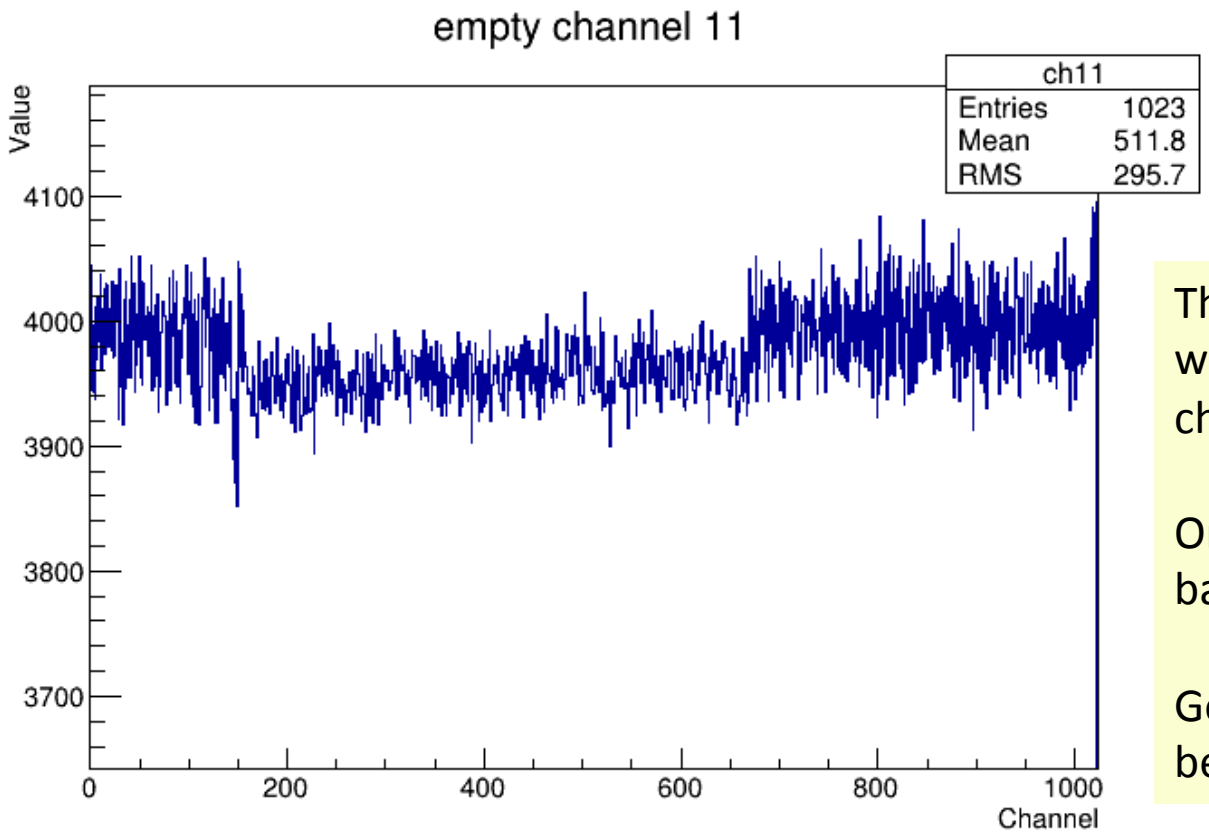
Double peaks in the baseline itself



This is the distribution of the subtracted baseline in ch4

Nice double peak here, too

I think this comes from this…

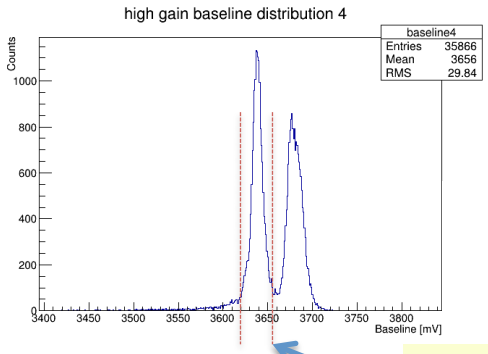


This is the blown-up waveform from an empty channel

One can see distinct baselines

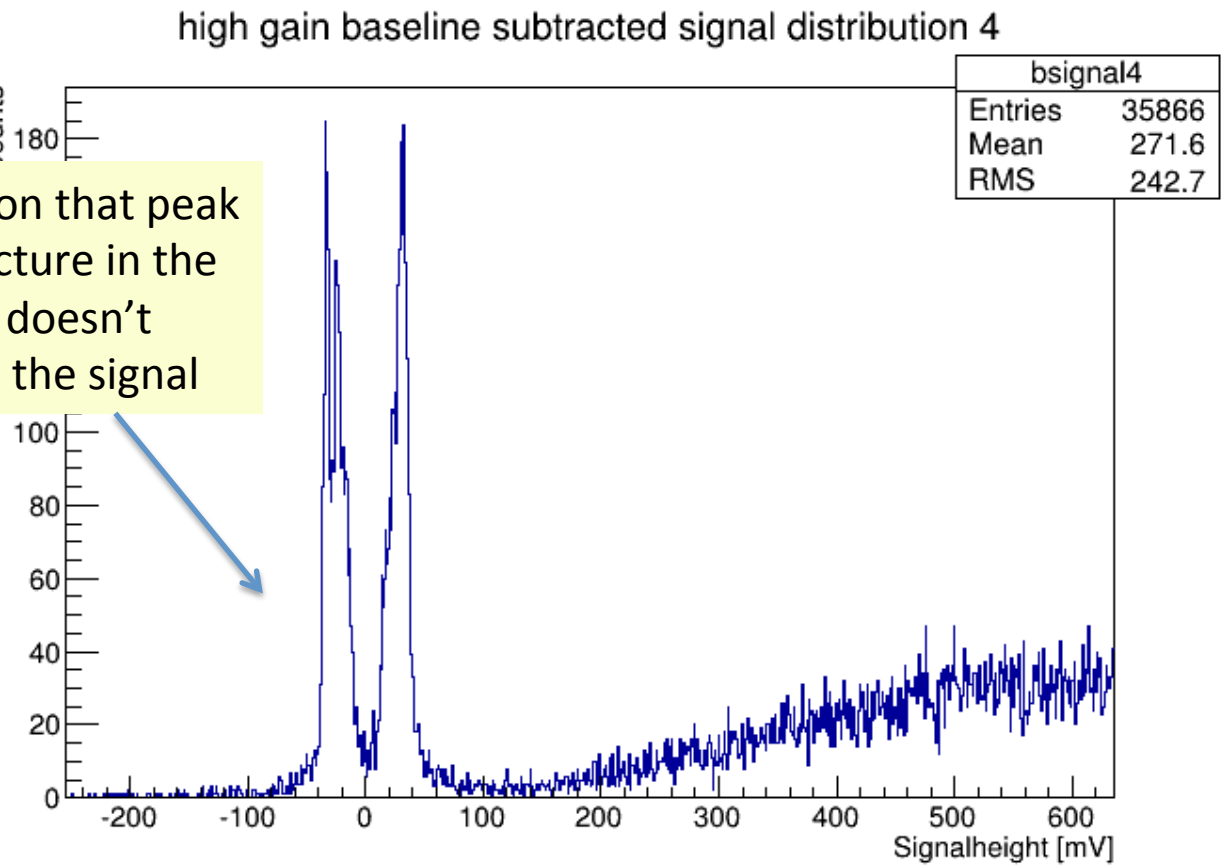
Gotta work on that one, because…

Seeing Double



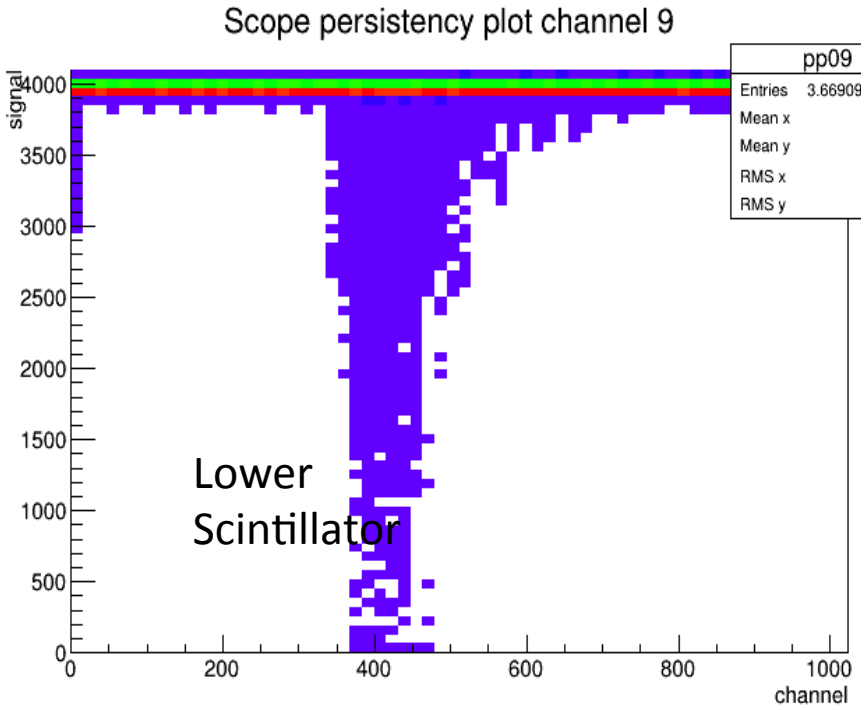
Cut on that peak structure in the BL… doesn't help

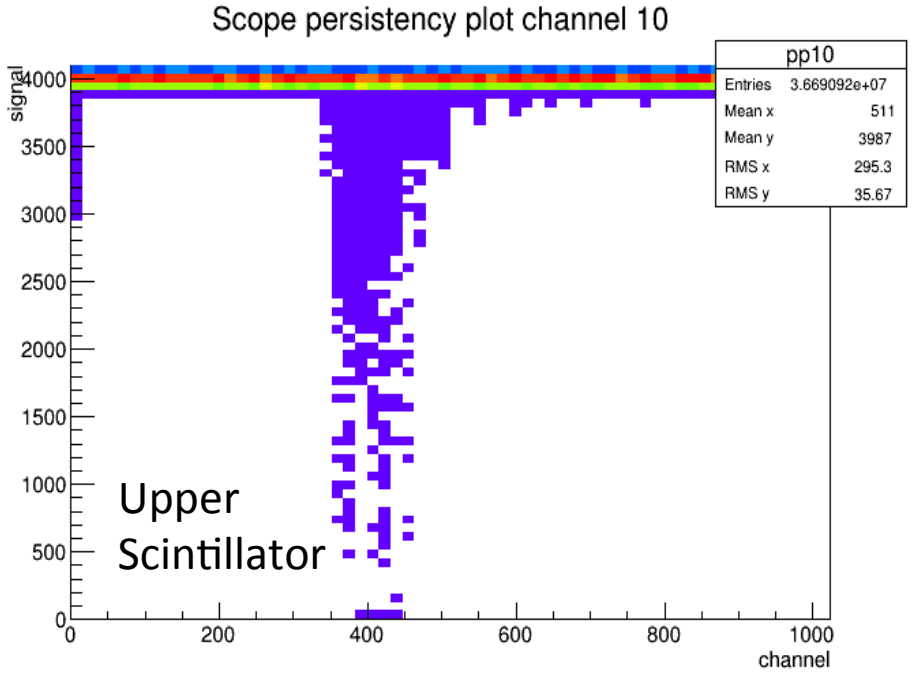
… distriminating against the double peak in the BL doesn't help



Addt'l scintillators

- Didn't get around to doing much with them yet
- They are in the data though
- Narrow down the cosmic muon path to get rid of the low peaks.





Next Things to Try

- Using the additional scintillators to narrow down paths through the stack
- Trying different sample rates (5GS is overkill)
- Switching the 4 high-gain channels to a DRS4 Eval board (less noise, superior quality)
- Trying the Struck 3100 FADCs (the ones we used at FNAL for the MPC readout)